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Assessing endothelial vasodilator function with the Endo-PAT 2000.

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Abstract

The endothelium is a delicate monolayer of cells that lines all blood vessels, and which comprises the systemic and lymphatic capillaries. By virtue of the panoply of paracrine factors that it secretes, the endothelium regulates the contractile and proliferative state of the underlying vascular smooth muscle, as well as the interaction of the vessel wall with circulating blood elements. Because of its central role in mediating vessel tone and growth, its position as gateway to circulating immune cells, and its local regulation of hemostasis and coagulation, the the properly functioning endothelium is the key to cardiovascular health. Conversely, the earliest disorder in most vascular diseases is endothelial dysfunction. In the arterial circulation, the healthy endothelium generally exerts a vasodilator influence on the vascular smooth muscle. There are a number of methods to assess endothelial vasodilator function. The Endo-PAT 2000 is a new device that is used to assess endothelial vasodilator function in a rapid and non-invasive fashion. Unlike the commonly used technique of duplex ultra-sonography to assess flow-mediated vasodilation, it is totally non-operator-dependent, and the equipment is an order of magnitude less expensive. The device records endothelium-mediated changes in the digital pulse waveform known as the PAT (peripheral Arterial Tone) signal, measured with a pair of novel modified plethysmographic probes situated on the finger index of each hand. Endothelium-mediated changes in the PAT signal are elicited by creating a downstream hyperemic response. Hyperemia is induced by occluding blood flow through the brachial artery for 5 minutes using an inflatable cuff on one hand. The response to reactive hyperemia is calculated automatically by the system. A PAT ratio is created using the post and pre occlusion values. These values are normalized to measurements from the contra-lateral arm, which serves as control for non-endothelial dependent systemic effects. Most notably, this normalization controls for fluctuations in sympathetic nerve outflow that may induce changes in peripheral arterial tone that are superimposed on the hyperemic response. In this video we demonstrate how to use the Endo-PAT 2000 to perform a clinically relevant assessment of endothelial vasodilator function.

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